What is claimed is:

1. A catheter for delivering a fluid to an injection site in heart tissue, comprising:

a shaft having a proximal end and a distal end, the distal end of the shaft including a primary penetrating member and a secondary penetrating member having an injection lumen, wherein the primary penetrating member penetrates the heart tissue at the injection site in a first direction, and wherein the secondary penetrating member penetrates the heart tissue in a second direction different from the first direction.

2. A catheter as in claim 1, wherein the distal end of the shaft includes a plurality of secondary penetrating members.

3. A catheter as in claim 2, wherein 1 to 20 secondary penetrating members are utilized.

4. A catheter as in claim 2, wherein the plurality of secondary penetrating members comprise microneedles.

5. A catheter as in claim 1, wherein the second direction is generally lateral to the first direction.

6. A catheter as in claim 1, wherein the second direction is at an angle of about 5 to about 90 degrees relative to the first direction.

7. A catheter as in claim 6, wherein the first direction is generally orthogonal to the heart tissue at the injection site.

8. A catheter as in claim 7, wherein the primary penetrating member comprises an opening, and the secondary penetrating member extends through said opening.

9. A catheter as in claim 8, wherein the primary penetrating member includes a means for directing the secondary penetrating member through the opening in the primary penetrating member.

10. A catheter as in claim 9, wherein said means for directing the secondary penetrating member through the opening in the primary penetrating member comprises a lumen within primary penetrating member extending generally in the longitudinal direction and transitioning to a generally lateral direction at the opening.

11. A catheter as in claim 1, further comprising a sheath disposed about the shaft.

12. A catheter as in claim 11, wherein the sheath has a proximal end, a distal end and a lumen disposed therein.

13. A catheter as in claim 12, wherein the distal end of the sheath includes a

suction head.

14. A catheter as in claim 1, wherein the primary penetrating member has a diameter in the range of approximately 20 to 36 Gauge.

15. A catheter as in claim 14, wherein the secondary penetrating member has a diameter in the range of approximately 27 to 40 Gauge.

16. A catheter system for delivering a fluid to heart tissue, comprising:

a pressurized fluid source containing a fluid therein; and

a catheter having a proximal end and a distal end, the proximal end of the catheter connected to the pressurized fluid source, the distal end of the catheter including an axial penetrating member having a plurality of lateral penetrating members connected thereto, each of the lateral penetrating members having a lumen in fluid communication with the pressurized fluid source such that fluid may be delivered to the heart tissue via the lateral penetrating members.

17. A catheter system as in claim 16, wherein the pressurized fluid source is pressurized to a relatively low pressure of less than approximately 1 ATM.

18. A catheter system as in claim 16, wherein the pressurized fluid source is pressurized to a relatively high pressure of greater than approximately 30 ATM.

19. A catheter system as in claim 16, further comprising:

a vacuum source; and

a sheath disposed about the catheter, the sheath having a proximal end, a distal end and a suction lumen disposed therein, the proximal end of the sheath connected to the vacuum source with the suction lumen of the sheath in fluid communication with the vacuum source, wherein the distal end of the sheath is disposed adjacent the heart tissue such that the distal end of the sheath is stabilized against the heart tissue when a vacuum is applied to the suction lumen using the vacuum source.

20. A method of delivering a fluid to an injection site in heart tissue of a patient, comprising the steps of:

providing a catheter comprising a shaft having a proximal end and a distal end, the distal end of the catheter including a primary penetrating member and a secondary penetrating member;

inserting the catheter into the patient;

navigating the catheter until the distal end of the catheter is positioned adjacent the injection site;

actuating the primary penetrating member such that the primary penetrating member penetrates the heart tissue at the injection site in a first direction;

actuating the secondary penetrating member such that the secondary penetrating member penetrates the heart tissue in a second direction different from the first direction; and

injecting the fluid into the heart tissue via the secondary penetrating member.

21. A method of delivering a fluid as in claim 20, wherein less than approximately 100 microliters of fluid is injected into the heart tissue via the secondary penetrating member.

22. A method of delivering a fluid as in claim 20, wherein the catheter includes a plurality of secondary penetrating members, and wherein fluid is injected into the heart tissue via the secondary penetrating members.

23. A method of delivering a fluid as in claim 20, wherein the secondary penetrating members comprise microneedles, and wherein fluid is injected into the heart tissue via the microneedles.

24. A method of delivering a fluid as in claim 23, wherein approximately 1 to 20 microliters of fluid is injected into the heart tissue via each microneedle.

25. A method of delivering a fluid as in claim 20, wherein the secondary member is retained in the tissue for a period of time after the fluid has been injected into the tissue in order to allow the fluid to be absorbed by the tissue.

26. A method of delivering a fluid as in claim 25, wherein the period of time ranges from about 5 seconds to about 120 seconds.

27. A method of delivering a fluid as in claim 25, wherein the period of time ranges from about 5 seconds to about 30 seconds.